The effect of maternal nutrition during mid- to late-pregnancy on ewe and lamb behaviour and the association with lamb survival

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ABSTRACT

Lambing percentage in New Zealand has increased by almost 30% in the last 20 years. This increase is associated with a greater percentage of twin- and triplet-born lambs which have lower survival rates than singletons. The behaviour of the ewe and her lambs has been associated with lamb survival, however, relevant data on the effect of ewe mid-pregnancy body condition score (BCS) and nutrition on ewe and lamb behaviour under New Zealand pastoral farming conditions is scarce. This research included seven experiments investigating the effects of feeding ewes, with a BCS of 2.0 to 3.0 at mid-pregnancy, either *ad libitum* or only sufficient to meet pregnancy maintenance requirements from mid- to very late-pregnancy, on ewe and lamb behaviour at 3 to 24 hours after birth. The association between behaviour and lamb survival was also investigated. Observations on ewe and lamb behavioural were conducted at tagging (3 to 18 hours after birth) and in a triangle pen test at approximately 12 or 24 hours after birth.

The effects of ewe mid-pregnancy BCS and feeding on behaviour were somewhat inconsistent across experiments, possibly due to variations in the timing and length of feeding treatments. Feeding ewes *ad libitum* in comparison to pregnancy maintenance requirements did not consistently improve the maternal behaviour score (MBS) of the ewe. This is not surprising as neither of the feeding treatment groups were nutritionally restricting. There was some evidence to suggest that lambs born to ewes offered the pregnancy maintenance diet exhibited a greater need, possibly due to a weaker ewe-lamb bond than lambs born to ewes on the *ad lib* treatment. This need was characterised in twins, in chapter four, by greater low-pitched bleating rates and

decreased time to contact, suck and follow the dam. Similar, but inconsistent results were reported in other chapters. Further, when investigating the relationship between behaviour and survival, it was found that twin-born lambs with the greater need (followed their dam more quickly) were more likely to die. The opposite relationship was found in triplet-born lambs, which may be a reflection of greater competition for milk within triplet-litters compared to twin-litters. Thus, in both twin- and triplet-born lambs following behaviour is an indicator of mortality. The practical use of this behaviour as a tool to predict lamb survival is limited.

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Looking back three years and I cannot believe I am almost at the end of my PhD journey. The last three years have consisted of a lot of hard work, sleepless nights and more than a little frustration. But they have also been fun, allowed me to grow in many ways and been incredibly rewarding. Would I do it again? No way! Do I regret a single day? Absolutely not!

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“Begin at the beginning," the King said, very gravely, "and go on till you come to the end: then stop.”

— Lewis Carroll, *Alice in Wonderland*

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Abbreviations

Ad lib *Ad libitum*

BCS Body condition score

MBS Maternal behaviour score

DM Dry matter

ha Hectare

CI Confidence interval

Notation

P*n* The *nth* day after start of breeding, with P0 being the first day that the ram was introduced to the ewes in the experiments.

L*n* The *nth* day of lambing, with L0 being the mean day of lambing for the ewes considered.

G*n* The generation of sheep used in the study. G0 being the first generation in chapter six to be exposed to feeding treatments, G1 being their progeny and G2 being the progeny of the G1.